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## **Newspaper coverage of water issues in Australia**

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### Abstract

The media has been found to have an impact on public debate, public opinion, and public policy agendas. Public debate, and public opinion about water conservation and water supply management projects matter because they can influence specific outcomes. For example, public opinion can potentially lead to positive behaviour, like increased water conservation, or potentially negative behaviours such as public opposition to developments such as dams or water recycling plants, which may be necessary under changing climatic conditions. It is therefore critical to understand how the media reports on water-related topics. Results from a content analysis of 1253 newspaper articles published in Australia in 2008 indicate that water-related reports are characterised by lack of inclusion of views held by various stakeholders, a low level of support of statements with scientific evidence, a low level of impartiality in the sense of reporting on opposing views and a relatively high level of hedging, meaning that the author signals that there is some uncertainty about the reported information. In sum these tendencies could theoretically culminate to work against public engagement in water issues and undermine the public's understanding of and confidence in water management measures. Proactive measures of media management are recommended.

### Keywords

water, issues, newspaper, australia, coverage

### Disciplines

Business | Social and Behavioral Sciences

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# **Newspaper coverage of water issues in Australia**

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## **Abstract**

The media has been found to have an impact on public debate, public opinion, and public policy agendas. Public debate, and public opinion about water conservation and water supply management projects matter because they can influence specific outcomes. For example, public opinion can potentially lead to positive behaviour, like increased water conservation, or potentially negative behaviours such as public opposition to developments such as dams or water recycling plants, which may be necessary under changing climatic conditions. It is therefore critical to understand how the media reports on water-related topics. Results from a content analysis of 1253 newspaper articles published in Australia in 2008 indicate that water-related reports are characterised by lack of inclusion of views held by various stakeholders, a low level of support of statements with scientific evidence, a low level of impartiality in the sense of reporting on opposing views and a relatively high level of hedging, meaning that the author signals that there is some uncertainty about the reported information. In sum these tendencies could culminate to work against public engagement in water issues and undermine the public's understanding of and confidence in water management measures. Proactive measures of media management are recommended.

**Key words:** water, mass media, Australia, newspapers, information, public

## 1. Introduction

Australia is a large country, with diverse ecosystems and climates. Drought and flooding rains are a natural part of the country's climatic experience. During the 2000s, many locations around the country were impacted by a prolonged drought period. Water storage levels decreased to unprecedented levels in many urban areas. For example, in 2009 the water storage levels in dams around Melbourne, home to over four million people, dropped to below 30% (Melbourne Water 2012). As a consequence, in many locations across Australia, water restrictions were imposed, and projects for wastewater recycling and seawater desalination were planned and/or implemented. Regional areas were not immune to these water challenges. One small town, Euroa in Victoria, ran out of water and had to have water trucked into the town to meet need (Kleinman 2007).

Australians largely accepted and adhered to water restrictions (Hurlimann 2011), but displayed substantial resistance against major projects aiming at increasing water supply. For example, in Queensland the public protested against the proposed construction of an additional dam (Green and Madigan 2009); in Melbourne members of the public opposed the construction of a desalination plant (Watershed Victoria 2009); and in Toowoomba the local community voted against the development of a potable water recycling project despite critically low dam levels (Hurlimann and Dolnicar 2010).

During this time of drought, there was also significant criticism of media coverage of water issues, especially in the context of the Toowoomba referendum, where the public voted against a water recycling plant being constructed (van Vuuren 2009). An analysis of 1200 Australian newspaper articles covering water issues in early 2007 concludes that water recycling was "*being stymied by the 'Yuk factor' and political point scoring*" (Media Monitors 2007). Despite critically low water supply levels and the significant amount of media coverage of water issues (Media Monitors 2007), the public did not feel well informed about alternative water sources (Dolnicar and Hurlimann 2009).

It is acknowledged that providing people with more or better information alone is not enough to foster behaviour change (Nerlich et al. 2010), more scientific knowledge does not necessarily reduce uncertainty (Pellizzoni 2010), and technical knowledge is not the only component in decision making (Cook et al. 2004). However, being informed about water issues has been shown to be associated with some increase in the levels of beneficial water behaviours and attitudes, including water conservation (Dolnicar et al. 2012; Trumbo and O'Keefe 2005), recycled water acceptance (Dolnicar et al. 2010; 2011; Lohman and Milliken 1985; Tsagarakis and Georgantzis 2003) and desalinated water acceptance (Dolnicar et al. 2011; Dolnicar and Schäfer 2009).

It is therefore critical to analyse and understand the information about water-related issues which has been disseminated by Australian newspapers to the public. Added to this, it is important to understand whether information provision by newspapers (and media in general) has the potential to positively influence public attitudes towards water conservation, as well as acceptance of necessary projects to secure Australia's future water supply under changing climatic conditions. This is the motivation for the present study. Specifically, we investigate the following research questions empirically:

- (1) How did the main Australian newspapers report on water-related issues in 2008?

- (2) Did Australians recall reading any water-related articles in the newspapers during that time period?
- (3) Did coverage of water issues differ across seasons?
- (4) Did media reports include scientific evidence, were they impartial, and were they hedged?

## **2. The impact of mass media**

Mass media are a central part of people's lives. Many people read the newspaper in the morning, listen to the radio while commuting to work, and watch the news on television in the evening. Specifically in Australia, ninety six per cent of all households are equipped with a television, about seven per cent subscribe to cable television, and the population watches an average of twenty two hours of television a week (UNESCO Institute for Statistics 2011). With regards to newspapers, forty eight are available to the Australian population across the country, with a total daily circulation of 3,083,000 (UNESCO Institute for Statistics 2011). Additionally, the internet is opening new opportunities for print media (Lebert 2008).

Although media users interpret information provided them through the media in different ways (Shoemaker and Reese 1990), there is general agreement that mass media shape public conceptions of reality and influence attitudes and behavior (Jamieson and Campbell 1992). A number of different hypotheses of how exactly this occurs have been proposed.

One such hypothesis is referred to as agenda setting. The assumption is that there is a "*relationship between relative emphasis given by the media to various topics and the degree of salience those topics have for the general public*" (Ader 1995 p.300). Evidence for the occurrence of agenda setting has been provided by Behr and Iyengar (1985) who demonstrated the effect empirically using three topics (energy, inflation, and unemployment). Specifically, they found media agenda setting to be unidirectional meaning that television news influenced public concern, but public concern did not influence topics covered by the media.

Soroka (2002) confirmed the interactions between media, public opinion, and policymakers, but posits that the nature and direction of the relationship depends on topic attributes, such as obtrusiveness or associated dramatic events. Soroka found that in the Canadian context, environmental issues were media driven (measured using content analysis). That is, the media had a significant impact on both public debate (measured through opinion polls) and policy agendas (measured using indicators such as the analysis of parliament question period content, committee reports, bill discussions). This was said to have occurred because the environmental issues investigated were largely unobtrusive and that events had dramatic impacts. Similar findings supporting the agenda setting effect by media in the context of environmental topics were reported by Trumbo (1995), Ader (1995) and Allen et al. (2000).

Another hypothesis relating to the nature of media influence is known as framing. McCombs and Ghanem (2001 p.70) define framing as "*the construction of an agenda with a restricted number of thematically related attributes in order to create a coherent picture of a particular object.*" In comparison to the empirical work conducted to investigate agenda setting, the work surrounding the framing effect is more limited (McCombs and Ghanem 2001) and results are mixed. Marks et al. (2007) found media

frames were associated with differences in public perception of biotechnologies in the USA and UK. Interestingly, they found that while international events influenced media coverage, they were locally framed. Specifically related to water, Jönsson's (2011) study analysed media coverage and framing of risks to the Baltic Sea's ecosystem in Sweden. They found that the discourse in Sweden's *Dagens Nyheter* was influential in putting the Baltic Sea and the environmental risks related to it, on the public agenda.

It is acknowledged that a large number of factors potentially affect media content. These can include: the need to attract and retain media audiences; the need to avoid offending advertisers, the audience or media owners; and attempts by different actors (e.g. politicians) to influence media coverage (Jamieson and Campbell 1992). Other influences include media staff's personal attitudes and role conceptions; routines of media work; media organizational structure and culture; the relationships between the media and other social institutions; and other cultural and ideological forces (Shoemaker and Reese 1990), including the code of ethics by which journals in most countries are bound.

Australian journalists who are members of The Media Entertainment and Arts Alliance, are required to follow the Association's code of ethics (Media Entertainment and Arts Alliance 2012) which states that journalists "*inform citizens and animate democracy. [...] They scrutinize power, but also exercise it, and should be accountable.*" Journalists commit to being honest, fair, independent, and to respect the right of others. A key clause in the code relevant to our research states that journalist will "*report and interpret honestly, striving for accuracy, fairness and disclosure of all essential facts. Do not suppress relevant available facts, or give distorting emphasis.*"

This can sit uncomfortably in the reality of the increasing commercialization of the production of news (outlined well for the Australian context by Grattan 1998). Grattan (1998) suggests that commercial pressures (e.g. from newspaper income streams) are influencing media content in some situations. This view is formed in the acknowledgement that "*a newspaper that is part of a conglomerate that owns a whole lot of other enterprises [the case for numerous newspapers in Australia] has perpetual conflicts of interests*" (Grattan 1998 p.13).

Interestingly, while codes of ethics have clearly been developed to ensure fair reporting, a recent study of newspaper and television coverage of climate change in the USA found that "*consistent adherence to interacting journalistic norms [including: objectivity, fairness, accuracy, and balance] has contributed to impediments in the coverage of anthropogenic climate change*" (Boykoff and Boykoff 2007 p.1190). In particular, they found that in seeking balanced reporting (e.g. giving equal weighting to opposing views), an informational bias was provided to climate change skeptics. The authors suggest that 'balance' has often been seen as a substitute for objectivity, particularly since 'objectivity' was removed from the Society of Professional Journalists ethics code.

Media content, or rather the interpretation of media content, is also affected by the way in which content is presented. A distinct form of presentation which is of interest to our study is referred to as hedging. Myers (1989 p.12) defines hedging as a politeness strategy which "*marks a claim or any other statement, as being provisional, pending acceptance in the literature, or in the community – in other words acceptance by the*

*readers.*” The term hedging was originally developed for the analysis of scientific texts written for professional audiences, but has since been applied in media contexts.

Hedging, used in the media, conveys a degree of uncertainty about the issue being reported. This uncertainty can arise from the way in which the issue is presented *to* the journalist, or through the way in which the information is presented *by* the journalist. For example, Fortner et al. (2000) found that media reports about climate change in Columbus (USA) during 1997 were scarce and half of the references to global warming were hedged. However, of these cases of hedging, the hedging was not found to be related to uncertainty about the climate change impacts being reported – thus the uncertainty arose from the way the issue was presented by the journalist. In the context of media coverage of water-related issues, hedging is of particular interest because it may impact how the public interprets critical information, such as the safety of treated wastewater for drinking.

### **3. Media reporting of water-related topics**

Only a small number of studies have explored the role of media in the context of water supply management. Dolnicar and Hurlimann’s (2010) Australian study conducted in 2009 found that the media was rated the fourteenth most influential, out of a total of nineteen sources of information, with 45 per cent of Australians stating they believed the media was influential in this context. Note that this is not a contradiction to the collective bodies of work in the disciplines of communication and marketing which conclude that media content influences beliefs, firstly because almost half explicitly admit that this is the case and, secondly because self-reported influence is likely to underestimate influence given that people are not necessarily consciously aware of factors influencing their beliefs.

Other studies conclude that media is not a trusted source of information about recycled water (Lohman and Milliken 1985; Miller and Buys 2008). Miller and Buys’ Australia study conducted in South East Queensland in 2007 with 408 participants found the media was the least trusted information provider of nine sources explored. The CSIRO (Commonwealth Scientific and Industrial Research Organisation), Universities, and medical institutions were the top three trusted organisations to ‘tell the truth’ about water recycling and grey water. The least trusted sources of information were the media and all levels of government (local, state and national). Lohman and Milliken’s study was conducted in Denver in 1982 and 1985 with 399 and 403 respondents respectively. They found that the most believable source of information about water matters (out of 4 investigated) was the Denver Water Department (60.5% of respondents in 1982; and 70.5% in 1985) followed by newspapers (19.4%; 11.7%), TV/radio (10.5%; 9.4%), then other people (1.6%; 3.3%).

A small number of studies have analysed media coverage of water issues to date. Two studies investigated water recycling. In an analysis of media coverage in the lead up to the Toowoomba referendum, Van Vuuren (2009) found the local paper was predominantly neutral in its coverage of the issue, yet advertisers in the paper were both in the yes and no camp. Van Vuuren suggests the paper’s neutrality protected their largest revenue streams. Overall Van Vuuren’s assessment indicates the local newspaper has a limited effect on the outcome of the vote, but in contrast a influential local opinion leader played an important role.

On the contrary, Leong's (2010) comparison of media coverage of recycled water projects in Queensland (Australia) and Singapore for the period 1997-2008, found that the media was a key institutional partner in shaping public perception, public learning and institutional change. Leong concluded that the Australian media was more emotive and negative towards recycled water.

Campbell et al.'s (2011) content analysis research, studied the role of a local newspaper in a rural Australian community in the midst of an extended drought period. They found that the paper tended to focus on positive stories, reflecting the community's need for improved morale. However, the authors also found that the newspaper may have acted as power brokers by selecting coverage of particular groups' activities over others.

Schmidt et al (2007) used content analysis to examine public discourse themes about land use and water quality in the Upper Mississippi River basin (USA) in newspapers across a five year period. They found that while there was a readiness and willingness to take action to protect water quality, there was only a weak link acknowledged between specific forms of land use, land management and resulting water quality. The authors recommend that educators and land managers who are working to improve water quality could enhance their efforts by engaging in more dialogue with the public through newspapers to: firstly raise awareness of a variety of actions that would improve water quality, and secondly to stress the relationship between certain land uses and water quality.

Lyytimäki (2007) explored water eutrophication in the Finnish press, which was one of the most prominent environmental issues over summer time, due to the ample information provided by scientists and authorities conducting a monitoring programme on harmful algae. Lyytimäki found that press coverage of eutrophication focused on events (summer algae blooms) rather than the long term anthropogenic driving forces of these events. Hence they see a key challenge for scientists is to capture the interest of the media to report matters relating to the more long term anthropogenic forces driving eutrophication.

A comprehensive content analysis of water issues covered in Australia's national, metropolitan, regional and specialist newspapers, radio, and television news media between January and April 2007 was conducted by Media Monitors (2007). The study identified 81,894 reports about water, the majority of which were radio broadcasts (67%). Key findings based on a subsample of 1200 newspaper articles include that the reporting of water issues was focused on the problem, rather than potential solutions; and that the majority of reports contained claims by politicians and interest groups that would be potentially affected by infrastructure proposals. They conclude that there was very limited objective information and education for the public to make informed decisions.

#### **4. Method**

Content analysis was used to analyze water-related media reports. Content analysis is commonly used for media analyses (Shoemaker and Reese 1990). The top seven Australian newspapers – in terms of circulation – and their corresponding weekend newspapers were chosen for the study. These newspapers are based in five states'

capital cities, with two newspapers in each of Sydney and Melbourne. Additionally, for comparison we included *The Northern Territory News* based in Darwin – the only capital city in Australia with a water surplus in 2008. Details of the newspapers analysed, their characteristics, and each city’s water context are provided in Table 1.

**Table 1: Key characteristics of the Australian newspapers analysed in the sample**

Newspaper	National ranking / Daily circulation*	Corresponding Sunday Newspaper title	Newspaper’s Location	Location’s water context in 2008**
The Adelaide Advertiser	6/ 191,156	The Adelaide Advertiser	<b>Adelaide</b>	Water supply obtained largely from Murray river and dams. Dams: 59%. Water restrictions in place.
The Courier Mail	3/ 216,563	Sunday Mail	<b>Brisbane</b>	Dams: 38%. Water restrictions in place. Desalination and potable recycled water systems were being constructed.
The Northern Territory News	22/ 22,989	Sunday Territorian	<b>Darwin</b>	Dams: 100%. No restrictions or augmentation plans in place.
The Age	7/ 190,100	The Sunday Age	<b>Melbourne</b>	Dams: 35%. Water restrictions in place. Desalination system was planned.
The Herald Sun	1/ 500,800	Sunday Herald Sun		
The West Australian	4/ 212,869	The Sunday Times	<b>Perth</b>	Dams: 35% Water restrictions in place. Desalination plant in operation and others planned. Indirect potable recycled water system planned.
The Sydney Morning Herald	5/ 204,421	The Sydney Morning Herald	<b>Sydney</b>	Dams: 66% Water restrictions in place. Desalination plant was planned.
The Daily Telegraph	2/ 363,399	The Sunday Telegraph		

\*Number of copies distributed on an average day (Monday to Friday). Source of information (The Newspaper Works 2010), dates are for July-September 2010.

\*\* Dam capacity figures are from March 2008, source (Water Services Association of Australia 2008)

Articles published on all days of the week were included for three sample periods in 2008 which represented distinct seasons (summer, autumn, and winter): 1 January – 6 February; 1 April – 6 May; 1 August – 6 September. It should be noted that the limitation to print media, eight newspapers and the decision to draw three samples periods was a consequence of financial constraints. Obtaining articles is not difficult or expensive, but coding them is extremely labor intensive and therefore costly.

The following keywords were used to search for articles within the selected newspapers: water; water recycling; recycled water; wastewater recycling; waste water recycling; water reuse; water reclamation; desalinated water; seawater desalination, desalination; water conservation; water restriction\*, drought\*. Many retrieved articles were not specifically relevant to our research, for example there were many articles about sport which referred to drought e.g. ‘Sharks can end drought’ *Herald Sun* 22/8/8, was an article about a football team’s prospects of ending a 40-year premiership drought. Such articles were excluded. Articles which appeared in more than one edition of the paper were also removed to avoid double counting; the first edition was retained.

The following information about each newspaper article was coded:

- Primacy of water issue in the article (measured through article title and content)
- Primacy of article within the newspaper (page number, word count, photos/images used)
- Article type (e.g. news, opinion piece<sup>i</sup>, editorial, letter to the editor<sup>ii</sup> etc.)
- Article content: type of water issue covered
- Author, their occupation and affiliation
- Types of people quoted in the article
- Evidence provided
- Impartiality (whether both sides of the issue were represented in the article)
- Hedging (in the context of water discussions)

To identify hedging, Fortner et al.'s (2000) list of hedging words was used: suggest, appear, could, might, tentative, uncertain, and most likely, and was extended by the following closely related words: seem, can, and may.

In line with Stempel's (1989) guidance for content analysis of media, we designed the categories for coding to be: objective, with the ability to be applied systematically by numerous coders (four), quantitative, and based on manifest content (rather than coder interpretation). Additionally we ensured that the categories were directly related to our study aims, were functional, and manageable by the coders. We developed definitions of key terms with examples for the coders. To ensure that the categories constructed were appropriate we met with each of the coders to ensure clarity of the task at various time periods.

At the early stages of coding the intercoder reliability across six articles (97 items coded for each article) was 78%<sup>iii</sup>. This was close to Poindexter and McComb's (2000) recommended 80% thus indicating the coding in our study was reliable<sup>iv</sup>. Nevertheless, we made a few changes, as recommended by Stempel (1989) to further improve intercoder reliability: we reduced the number of categories within each variable of interest and added detail to definitions to reduce ambiguity. We did not retest the intercoder reliability.

In addition, a survey study was conducted in early 2009 using a permission based online research panel. The panel company recruits panel members representative of the Australian population who are available to participate in surveys, and contacts panel members for research purposes only. Respondents are invited via email to participate in the study, and they receive a small amount of compensation; typically a few dollars, depending on the length of the survey. The total number of completed surveys in the present study was 1495.

Participants were asked on how many days they usually read the newspaper, which is their favourite newspaper, on how many days they usually watch television, and which is their favourite television channel. They were then asked whether or not they recall seeing, hearing, or reading any news in the past six months on the following five topics: recycled water, desalinated water, the drought in Australia, dam levels and water conservation. These questions were a small component of a larger survey on Australian water attitudes and behaviours.

This approach has a number of limitations: due to budgetary constraints, we limited our investigation to eight newspapers and three sample periods. However, given that these are the newspapers with the widest circulation in the country, we believe that this selection will not bias results substantially. It also needs to be noted that we did not directly investigate the effect of the content of the articles on public understanding of water issues and potential behaviour changes (positive or negative). This would require an experimental study such as Dolnicar et al (2010), who found that stated likelihood of using recycled and desalinated water increased significantly when people are provided with information about the production process. Additionally, Kemp et al (2012) found that the public were influenced by the information presented to them about recycled water. The research suggests there may be a recency effect with regards to attitudes changing in the direction of the most recent information campaign they were exposed to (e.g. positive or negative).

## 5. Results and Discussion

### 5.1 How did the main Australian newspapers report on water-related issues in 2008?

The sample included 1253 valid articles; 39 per cent of these in the summer sample; 32 per cent in autumn; and 29 per cent in winter – the number of articles decreased as the respective season got colder. The exact distribution of articles across newspapers is provided in Table 2. The leading paper was *The Advertiser* (an Adelaide based newspaper), containing 29 per cent of the articles included in the sample. This could be due to Adelaide’s precarious water situation: Adelaide is dependent on River Murray water and thus relies on cooperation of three other Australian states to secure sufficient water supply. *The Northern Territory News* only published 18 articles related to water in the sample period. The probable reason is that their dams were full in 2008. However, apart from this case, the distribution of articles across newspapers did not correspond to dam levels of their respective location base (see Table 1).

**Table 2: Distribution of ‘water’ articles across the newspapers in the sample**

Newspaper*	Number of articles	Percentage of articles within our sample
The Advertiser	362	29
The Age	271	22
The Courier Mail	180	14
The Herald Sun	130	10
The Daily Telegraph	117	9
The Sydney Morning Herald	93	8
The West Australian	82	7
The Northern Territory News	18	1
TOTAL	1253	100

\*Note – the weekend papers are included in the equivalent weekday publication figures.

Water articles were not prominently positioned by newspapers. The average page number of articles was 23 (median 15, standard deviation (SD) 23) with only 4 per cent of articles appearing on the first page. The average word length of articles was 445 (median 368, SD 414); 93 per cent of articles did not span more than one page; 52 per cent of articles focused on water; for 42 per cent, water featured prominently in the title; and 19 per cent of articles included an image. With regards to days of the week on which water articles were published, there was quite an even distribution across the week. Saturdays were slightly more frequent (19%) followed by Sundays and

Wednesdays (each with 15%), then Tuesdays (14%), Thursdays (13%), Mondays and Fridays (both with 12%).

The majority of articles published were news articles (62%) followed by letters to the editor (17%), opinion pieces (8%), advertisements and advertising features (3%) and editorials (1%). A total of nine per cent fitted into other categories or their article type was not clear. Articles were predominantly authored by journalists (63%), followed by members of the public (17%), corresponding well to the types of articles published as noted above. The next major category of authors was politicians and members of independent groups or organisations (each with 1%). All other author categories contained fewer than 1% of articles, with a large number of author affiliations unclear, or unspecified. These findings indicate that public opinion was aired in our media sample, albeit predominantly through letters to editors which are typically short in length. This is contrary to Jönsson's (2011) Swedish study in which the public's opinion was found to be invisible, yet scientists received much more coverage in articles due to their proactive engagement with media. This is in contrast to the Australian sample, where scientists were not well represented in authorship or sources quoted in articles.

The water-related topics that were covered in the newspaper articles are shown in Table 3. Note that it was possible for more than one topic to be discussed in each article. Results indicate that the topic covered most frequently was drought (56%), followed by desalination (27%), and water use restrictions (17%). Some water issues were not frequently covered, for example, drinking recycled and desalinated water only received coverage in two and one per cent of articles respectively.

**Table 3: Water issues discussed in the newspaper articles contained in the sample**

Water Issue	Number of articles	Percentage of articles
Drought	699	56
Desalination in general	336	27
Water use restrictions	217	17
Water policy	170	14
Recycled water in general	167	13
Dam/water supply level	149	12
River health / environmental flows	132	10
Public awareness of water issues	125	10
Water conservation / saving water	119	9
Water supply pipeline extension / upgrade	119	9
Water tanks	92	7
Water price	78	6
Community talking about water issues	73	6
Water consumption	71	6
Dams / reservoirs	69	5
Reduced rainfall	68	5
Reduced use of water	63	5
Stormwater reuse	61	5
Water efficient appliances	47	4
Water demand	47	4
Water quality	37	3
Relocation due to lack of / nature of supply	31	2
Water sensitive urban design	27	2
Willingness to sacrifice time/money or convenience to save water	26	2
Joining a water interest group	26	2
Illegal water behaviour	21	2

Drinking recycled water	20	2
Drinking desalinated water	14	1
Other water issues	440	35

The dominant water issue reported was drought. During our sample period, drought was both an obtrusive issue (most people's daily lives were impacted by it), and a dramatic issue (its impacts were dramatic on many levels e.g. pictures of near empty dams, dead vegetation, cattle skeletons etc.). As discussed earlier, media influence may be limited for topics such as drought which are directly experienced by the public (Zucker 1978; Soroka 2002). However, while the drought is directly experienced by the public, it is also a dramatic event with high domestic relevance. Theory suggests that, there is more opportunity for media attention and impact on public opinion for issues that involve dramatic events that are domestically relevant (Wanta and Hu 1993; Soroka 2002). This suggests why drought has dominated in the summer sample of our study – there is more potential for impact on public opinion when an issue (drought) is dramatic and domestically relevant.

Statistically significant difference emerged in terms of coverage of specific water topics across newspapers including: desalination; recycled water in general; water supply pipeline extension/upgrade; dam/water supply levels; drought; water policy; rain water tanks, water sensitive urban design. We measured this coverage as the percentage of the newspaper's water related articles covering that particular topic. Results of this analysis, including the newspapers with the highest and lowest coverage of these topics are provided in Table 4.

**Table 4: Differences in water issues covered across the newspapers in the sample**

<b>Water issue</b> (significance level – Bonferroni corrected Chi-square p-values)	<b>Newspapers with highest coverage</b> (% of the paper's total water stories)	<b>Newspapers with lowest coverage</b> (% of the paper's total water stories)
<b>Desalination in general</b> (0.000)	The Age (42%) West Australian (34%)	The Northern Territory News (5%) Herald Sun (17%)
<b>Recycled water in general</b> (0.000)	The Age (22%) The Sydney Morning Herald (13%)	The Northern Territory News (0%) The Daily Telegraph (6%)
<b>Water supply pipeline extension/upgrade</b> (0.028)	The Age (21%) The Courier Mail (13%)	The Northern Territory News (0%) The West Australian (1%)
<b>Dams/reservoirs</b> (0.000)	The Courier Mail (12%) The West Australian (6%)	The Northern Territory News (0%) The Daily Telegraph (1%)
<b>Dam/water supply levels</b> (0.028)	The Courier Mail (24%) The Northern Territory News (22%)	The Daily Telegraph (3%) The Advertiser (7%)
<b>Drought</b> (0.000)	The Herald Sun (75%) The Northern Territory News (72%)	The Age (46%) The Advertiser (51%)
<b>Water policy</b> (0.000)	The Age (21%) The Advertiser (14%)	The Northern Territory News (0%) The Daily Telegraph (5%)
<b>Water tanks</b> (0.000)	The Age (13%) The Sydney Morning Herald (12%)	The Northern Territory News (0%) The West Australian (4%)
<b>Water sensitive urban design</b> (0.000)	The Herald Sun (6%) The West Australian (6%)	The Courier Mail (0%) The Daily Telegraph (0%) The Northern Territory News (0%)

Results indicate that coverage of particular topics does not vary by location only, but also by newspaper, providing evidence for the impact of editorial and journalistic decisions on topics covered, as postulated by Shoemaker and Reese (1990). For

example, in the case of recycled water in general, *The Age* had the highest percentage of articles covering this topic (22%), followed by *The Sydney Morning Herald* (13%). The papers with the lowest coverage of the issue included *The Northern Territory News* (0%), followed by *The Daily Telegraph* (6%). Given *The Sydney Morning Herald* and *The Daily Telegraph* are both based in Sydney location alone clearly does not explain differences in content, providing empirical evidence for the influence of editorial and journalistic decisions.

### ***5.2 Did Australians recall reading any water-related articles in the newspapers during that time period?***

Seventy-six per cent of Australians stated they watch television every day of the week, with the vast majority expressing a preference for privately run television channels; only 22 per cent of respondents stated that their preferred television channel was one of the two government-operated channels (SBS or ABC). About one quarter (26 per cent) of respondents stated that they read a newspaper every day with five per cent not reading newspapers at all. Of those who state a favourite newspaper, 26 per cent say that this is their local paper, 12 per cent name the Herald Sun, 11 per cent the Daily Telegraph, 10 per cent the Sydney Morning Herald, 7 per cent each *The Age* and the Courier Mail, and 6 per cent the West Australian. All other newspapers are favoured by less than five per cent of survey respondents.

When asked about seeing, hearing or reading anything in the media (in general – not specifically newspapers) about water issues over the past six months, 88 per cent stated that they recalled media coverage on the drought, 86 per cent on dam levels, 83 per cent on water conservation, 66 per cent on desalinated water, and 64 per cent on the issue of recycled water. Overall, these recall topics correspond well with the dominant water issues reported in our sample (reported in Table 3 and in section 5.1) which include: drought, desalination, water use restrictions, recycled water; dam/water supply levels, and water conservation.

### ***5.3 Did coverage of water issues differ across seasons?***

To determine whether topics differed across seasons, we computed Chi square tests for seasons and topics. Results are provided in Table 5. As can be seen, significant differences do exist. Note, however, that due to splitting by season and topic, some sample sizes are relatively low.

**Table 5: Differences in water issues covered across seasons**

<b>Water Issue</b>	<b>Summer % of total (n)</b>	<b>Autumn % of total (n)</b>	<b>Winter % of total (n)</b>	<b>Bonferroni corrected p</b>
<b>Public awareness of water issues</b>	6 (8)	1 (1)	93 (116)	0.000
<b>Willingness to sacrifice time/money or convenience</b>	8 (2)	8 (2)	85 (22)	0.000
<b>Community talking about water issues</b>	6 (4)	14 (10)	81 (59)	0.000
<b>Relocation due to lack of / nature of supply</b>	32 (10)	7 (2)	61 (19)	0.000
<b>Water policy</b>	17 (28)	26 (44)	58 (98)	0.000
<b>Water demand</b>	30 (14)	15 (7)	55 (26)	0.000
<b>River health / environmental flows</b>	17 (22)	33 (43)	51 (67)	0.000
<b>Water use restrictions</b>	50 (108)	23 (49)	28 (60)	0.021
<b>Water tanks</b>	27 (25)	26 (24)	47 (43)	0.028
<b>Drought</b>	43 (302)	33 (231)	24 (166)	0.000

<b>Recycled water in general</b>	27 (45)	41 (69)	32 (53)	0.028
<b>Desalination in general</b>	27 (45)	35 (119)	37 (125)	0.000
<b>Joining a water interest group</b>	0 (0)	0 (0)	100 (26)	0.000

The majority of the significant differences occur when the particular water related topic was dominant in the winter sample period, with two notable exceptions: coverage of the drought dominated in summer, and coverage of recycled water dominated in the autumn period. Many of the water topics which were reported more frequently in winter were less weather dependant such as: public awareness of water issues, joining a water interest group, relocation, and community discussions about water issues.

It is not surprising that drought was reported significantly more during the summer period, given summer is the season during which the peak impact of drought is experienced due to seasonally low rainfalls and high temperatures and evapotranspiration levels. Thus it is fit for greater media attention and influence on public opinion. This is in line with Lyytimäki's (2007) research in Finland which found water eutrophication was one of the most prominent environmental issues over summer time, when peak algae bloom events occur.

#### ***5.4 Did media reports include scientific evidence, were they impartial and were they hedged?***

Only 174 (14 per cent) of the articles presented scientific information about the water related topic discussed. In the vast majority (86 per cent) of articles scientific evidence was not cited, indicating that either the statements made indeed lacked backing or, alternatively, that the journalist chose not to cite the source of scientific information. Partially this can be explained by the fact that 30 per cent of the articles in the sample were opinion pieces or letters to the editor. But even among the articles written by journalist only 15 per cent provided scientific evidence.

One example is the article titled 'Port Hughes desal opposed' which was published in *The Advertiser* 2/2/2008) on the 2<sup>nd</sup> of January 2008. The 48 word article states that a petition had been started against a proposed desalination plant. The article then reports concerns by a local conservation group about the effect of brine discharge on the marine environment, but does not substantiate this with any factual information e.g. what are the brine levels, who is testing it, which levels are known to be dangerous for the marine environment in which way etc. While sometimes such information is not necessary, it typically would help those members of the public who are interested in the topic to better assess the community group concerns as well as whether or not they, the reader of the article, share the concerns. It would also contribute towards a greater information provision for the public who do not feel well informed about water issues (Dolnicar and Hurlimann 2009).

It is possible that constraints such as newspaper article length impact the ability to provide evidence through scientific information in articles. While the *Media Alliance Code of Ethics* does not require journalists to provide factual information of any kind to support their reports, it does acknowledge they play an important role in informing citizens, and that journalists should seek to accurately and fairly 'disclose essential facts', and 'aim to attribute information to its source.' Overall, our results concur with Media Monitors (2007): the reviewed newspaper articles offered very limited objective information for the public to make informed decisions.

Table 6 presents results relating to the sources quoted in the articles: 45 per cent of articles did not quote any source; 33 per cent quoted one source; 16 per cent quoted two sources; and 6 per cent quoted more than two sources. Politicians (19%) were the most quoted group of people on water issues (as suggested by Jamieson and Campbell 1992), followed by members of independent groups (10%), then members of the general public (9%). Scientists and engineers were only quoted in five per cent of the articles, academics in four per cent, and members of the Australian Water Association (the peak water industry body in Australia) were quoted in only one per cent of articles.

**Table 6: Sources of information quoted in water articles in the sample**

Source	Number of articles	Percentage of articles
Politician	236	19
Member / Representative of an independent group	127	10
Member of the public	112	9
Business Leader	103	8
Government Representative	98	8
Representative of a water authority	69	6
Scientist / Engineer	60	5
Member / Representative of an environmental group	56	5
Academic	46	4
Representative of a company with a vested interest in water	29	2
Member of the Australian Water Association	11	1
Developer	8	1
Other	130	10

This is in contrast to previous studies analysing media content relating to water. For example, Lyytimäki (2007) believes that the frequent coverage of eutrophication in the Finnish press over summer is due to the ample information provided by scientists and authorities. Similarly, Jönsson's (2011) found that the dominant actors in the media in the context of coverage of risks related to the Baltic Sea's ecosystem were authorities and scientific experts. The differences in these results may be due to different cultures valuing scientific input more than others, a hypothesis that should be tested in future research.

Interestingly, the sources quoted in the sample of articles do not reflect the sources listed as most influential by Australians in surveys: Dolnicar and Hurlimann (2010) found that Australians rated politicians as the least influential source of information about water issues (only 15 per cent of the sample rated them as influential). Research findings (88 per cent) were the most influential, according to the self-assessment of Australians. An individual or organisation qualified in water management was rated fifth (81 per cent) and scientists seventh (76 per cent). It can be concluded that there is a mismatch between sources the public wants to hear from and sources quoted by journalists.

In order to determine whether or not the sources quoted varied significantly between newspapers and geographical locations, we computed Chi square tests. The only statistically significant result (using Bonferroni-corrected p-values) was for 'representative of a water authority' (0.000). The newspaper with the highest percentage of water articles quoting representatives from a water authority was *The West Australian* (16%), followed by *The Courier Mail* (8%). Conversely, those with the lowest percentage included *The Advertiser* (2%) and *The Herald Sun* (2%).

However the explanatory factors cannot be pinpointed by our analysis. These differences could be the result of water authorities in Western Australia and Queensland providing a larger number of press releases or it could simply be explained by certain journalists or newspapers having a propensity to discuss issues with representatives of water authorities.

In terms of impartiality, only 121 articles (10 per cent of the sample) were classified as being impartial. For example the article titled 'Project will plug gaps in water grid' which appeared in the *The Courier Mail* on the 2<sup>nd</sup> of January 2008 was a 268 word article on the Queensland State Government's request for Federal Government Funding to connect a wastewater treatment plant to the Western Corridor Recycled Water Scheme. The article reports on expected environmental and water supply benefits of the scheme. Only one source is quoted: the State Premier. Contrary views are not presented.

Given the design of this study, it is not possible to provide an explanation for the low rate of impartiality. However it should be noted that 45% of articles did not quote any sources at all. Possible reasons for the low level of impartiality include: time strapped journalists may be increasingly reliant on information presented in press releases, and may not have the time to seek comment from those with opposing views. Alternatively, bias as defined by Johnstone (2008) may be occurring, namely overt preference or sympathy for a particular point of view. It could also be that the topic was not perceived as important or controversial enough to warrant such canvassing of opinion. While it may not be necessary to report on opposing viewpoints in every article – as found by Boykoff and Boykoff (2007) this may lead to distortion of information through informational bias - the impartiality rate of 10% is surprisingly low in an area where hard facts are available for nearly any topic, be it water conservation, recycling, desalination etc.

Hedging was observed in 438 cases (35% of the articles). For example, the article titled 'Some rain tumbled down in July, but it's not dam good enough' which was published in *The Age* on the 2<sup>nd</sup> of January 2008 used hedging words in a number of instances to describe uncertainty surrounding future water supply. The article reported that rainfall for July in Melbourne fell short of monthly averages, and that 2008 continued to be a worrying year for those managing water supply in Victoria.

Sentences which included hedging words were: "Despite better than average rainfall north of Melbourne in July, Goulburn Murray Water said yesterday the coming summer could be the most difficult yet for farmers;" and "The authority had "limited operating experience" at such low water levels, and may need to resort to carting water." As can be seen, both these articles were referring to future water scenarios, and thus there was some degree of scientific uncertainty involved. It could be argued that, climatic predictions for the future allowed greater certainty of future conditions to be predicted than these hedging words suggest. It is not possible to determine whether the source of the hedging was directly related to the uncertainty of the water issue being reported, or journalistic bias, but from a reader's perspective it is unclear how to interpret the content of such an article. This potentially increases the level of confusion and insecurity about how serious the water shortage is as well as advantages and disadvantages of different approaches to secure Australia's future water supply.

## **6. Conclusions**

Globally, many locations face significant challenges to water management, particularly in the face of climate change and population growth. Information about water issues has been found to positively impact water-related behaviours and lead to changes in attitudes towards water augmentation proposals. Thus, the mass media have the opportunity to contribute to public debate and scrutiny of ways of managing water in the future by providing fair, objective information, presenting a wide variety of views as well as backing statements with hard facts or scientific evidence.

However, our review of newspaper articles published on water-related topics in Australia in 2008 found that reports in the seven newspapers which have the largest circulation in Australia were characterised by a lack of inclusion of the position of a broad range of water stakeholders; a low level of provision of scientific evidence of any kind; a low level of impartiality; and a relatively high level of hedging. These factors could culminate to work against public participation in water futures, and undermine their confidence in water management measures necessarily taken.

Evidence from the study indicates influence of editorial and journalistic decisions on the topics covered. Interesting is also the observation that researchers or scientists are very rarely quoted. Rather the primary group of people quoted in the context of water-related articles are politicians. This is contrary to prior research which has found the sources of information which the community view as influential with regards to water (research findings; qualified water experts and scientists).

Some of the characteristics of newspaper reporting on water issues found in our study may have arisen due to increased time pressures experienced by journalists (e.g. lack of time to interview more than one person, lack of time to search for scientific evidence, and, potentially as a consequence, the use of hedging words to immunise against attacks). This suggests that individuals and associations interested in the increase of knowledge about water-related topics in the general public could be more proactive in their communications with the media (e.g. the case of the Sweden) and point to people and articles which would reduce impartiality, hedging and statements without evidence provided. Another option would be systematic media monitoring, allowing for swift responses and uptake of counter opinions.

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<sup>i</sup> More lengthy position pieces which tend to be written by journalists or experts, in a dedicated section of the paper

<sup>ii</sup> Short letters written largely by general members of the public, printed in a dedicated section of the paper

<sup>iii</sup> The intercoder reliability was measured across three original coders. A fourth coder completed a proportion of the task assigned to one of the coders who moved to another job

<sup>iv</sup> While the use of percentage agreement has limitations (e.g. it does not measure how 'close' disagreements are or is subject to artificial inflation of the score by some researchers), it is one of the most common ways of reporting intercoder reliability (Lombard et al 2002).